PATENT

Atty. Dkt. No. AMAT/3083.P6/PDC/PDC/OR

IN THE CLAIMS:

Please amend the claims as follows:

1.   (Currently Amended)   A method for inspecting a surface of a substrate, the method comprising:

illuminating at least a portion of the surface with an optical signal emitted from a light source;

receiving, at a detector unit, a portion of the optical signal from the surface;

generating, at a processing unit connected to the detector unit, signal signature information for the substrate representing characteristics of the portion of the optical signal;

determining a mean value of the signal signature information;

subtracting the mean value of the signal signature information from a reference mean value; and

determining a topographical condition of the surface based on the difference between the mean value of the signal signature information and the reference mean value, wherein the signal signature information is indicative of process uniformity on the surface of the substrate.

2.   (Original)   The method of claim 1, wherein at least the steps of generating, determining and subtracting are caused by execution of a computer-readable program embodied on a signal-bearing medium.

3.   (Currently Amended)   The method of claim 1, wherein the ~~topographical condition~~ signal signature information comprises at least one of specular information, spectral information and any combination thereof.

4.   (Original)   The method of claim 1, wherein the detector unit is configured to receive the portion of optical signal comprising scattered light, reflected light, and any combination thereof.

5.   (Original)   The method of claim 1, further comprising:

determining whether a difference between the mean value of the signal-signature information and the reference mean value exceeds a predetermined value; and

if the difference exceeds the predetermined value, determining that the topographical condition is an unacceptable topographical condition.

6.   (Currently Amended)   The method of claim [[5]] 1, wherein the ~~unacceptable topographical condition~~ signal signature information comprises at least one of substrate reflectivity information, specular information, spectral information, substrate defect information, substrate damage information, particle contamination information, alphanumeric character information, and any combination thereof.

7.   (Currently Amended)   ~~The method of claim 1~~ A method for inspecting a surface of a substrate, comprising:

illuminating at least a portion of the surface with an optical signal emitted from a light source;

receiving, at a detector unit, a portion of the optical signal from the surface;

generating, at a processing unit connected to the detector unit, signal signature information for the substrate representing characteristics of the portion of the optical signal, wherein the generating step comprises determining a first number of data readings at a given intensity for a range of signal-signature values;

determining a mean value of the signal signature information;

subtracting the mean value of the signal signature information from a reference mean value, ~~and~~ wherein the reference mean value is determined using a second number of data readings at the given intensity for the range of signal-signature values; and

determining a topographical condition of the surface.

8.   (Currently Amended)   ~~The method of claim 1~~ A method for inspecting a surface of a substrate, comprising:

PATENT

Atty. Dkt. No. AMAT/3083.P6/PDC/PDC/OR

illuminating at least a portion of the surface with an optical signal emitted from a light source;

receiving, at a detector unit, a portion of the optical signal from the surface;

generating, at a processing unit connected to the detector unit, signal signature information for the substrate representing characteristics of the portion of the optical signal, wherein the signal signature information comprises a number of signal signature values;

determining a mean value of the signal signature information, and wherein determining the mean value of the signal signature information comprises:

summing the signal-signature values to yield a sum; and

dividing the sum by the number of signal-signature values;

subtracting the mean value of the signal signature information from a reference mean value; and

determining a topographical condition of the surface.

9.   (Currently Amended)   The method of claim 8, wherein the signal-signature values comprise[[s]] a plurality of signal-intensity values wherein each signal-signature value is weighted by a number of occurrences of the signal-intensity value.

10.   (Original)   A method for operating an optical inspection system, the method comprising:

sequentially optically inspecting a plurality of substrates with an optical signal, wherein the plurality of substrates includes a reference portion of substrates and a test substrate, wherein the test substrate is inspected subsequently to the reference portion of substrates;

determining a mean signal value for each of the plurality of substrates;

summing the mean signal values for the reference portion substrates to yield a sum;

dividing the sum by the number of reference portion substrates to derive a reference mean value;

PATENT

Atty. Dkt. No. AMAT/3083.P6/PDC/PDC/OR

subtracting the reference mean value from a mean signal value of the test substrate; and

determining a topographical condition of the test substrate.

11.   (Currently Amended)   The method of claim 10, wherein the ~~topographical condition~~ signal signature information comprises at least one of specular information, spectral information and any combination thereof.

12.   (Original)   The method of claim 10, wherein the reference mean value is a moving mean value recalculated for each consecutive test substrate using a mean value of a previous test substrate.

13.   (Original)   The method of claim 10, wherein the steps of sequentially optically inspecting, determining the mean signal value for each of the plurality of substrates, summing, dividing, subtracting and determining the topographical condition are caused by execution of a computer-readable program embodied on a signal-bearing medium.

14.   (Original)   The method of claim 10, further comprising:

determining whether the difference between the reference mean value and the test substrate mean value exceeds a predetermined value; and

if the difference exceeds a predetermined value, determining that an unacceptable topographical condition exists on the test substrate.

15.   (Original)   The method of claim 14, wherein the unacceptable topological condition comprises at least one of substrate reflectivity information, specular information, spectral information, substrate defect information, substrate damage information, particle contamination information, alphanumeric character information, and any combination thereof.

16.   (Original)   The method of claim 10, wherein sequentially inspecting comprises:

PATENT

Atty. Dkt. No. AMAT/3083.P6/PDC/PDC/OR

illuminating at least a surface of each of the plurality of substrates with an optical signal emitted from a light source;

receiving, at a detector unit, a portion of the optical signal from the surface; and

generating, at a processing unit, signal signature information for each of the plurality of substrates representing characteristics of the optical signal.

17. (Original) The method of claim 16, wherein the detector is configured to receive the portion of signal comprising at least one of scattered light, reflected light, and any combination thereof.

18. (Original) The method of claim 16, wherein the steps of illuminating and receiving are performed in a front-end environment of a cluster tool comprising a transfer chamber connected to the front-end environment by at least one load lock chamber.

19. (Original) The method of claim 16, wherein generating comprises determining, for each of the plurality of substrates, a first number of data readings at a given intensity of the portion of the optical signal for a range of signal-signature values.

20. (Currently Amended) A signal-bearing medium containing a program which, when executed by a controller, ~~causes the execution of a method~~ performs an operation comprising:

(a) configuring an optical inspection system in response to system configuration input;

(b) adjusting the optical inspection system in response to adjustment settings input;

(c) scanning a substrate using the optical inspection system;

(d) receiving substrate topography information from the optical inspection system ~~comprising data obtained from the scanning step~~;

(e) generating data representing characteristics of the substrate topography information; ~~performing an analysis of the substrate topography information comprising~~

PATENT

Atty. Dkt. No. AMAT/3083.P6/PDC/PDC/OR

~~at least one of a particle detection analysis and a process monitoring analysis, wherein the process monitoring analysis comprises:~~

[[(i)]]

(f) ~~determining whether a difference between~~ comparing a mean value of the data and a mean value of reference data ~~value exceeds a predetermined value~~ to determine a topographical condition on a surface of the substrate, wherein the data is indicative of process uniformity on the substrate surface~~; and~~

~~(ii)   if the difference exceeds the predetermined value, determining that an unacceptable topographical condition exists on the substrate.~~

21.   (Currently Amended)   The signal-bearing medium of claim 20, wherein the operation further comprises generating an output indicative of the topographical condition ~~wherein if an unacceptable topographical condition is determined, issuing an output status indicating the same~~.

22.   (Original)   The signal-bearing medium of claim 20, wherein the substrate topography information comprises at least one of specular information, spectral information and any combination thereof.

23.   (Original)   The signal-bearing medium of claim 20, wherein the substrate topography information comprises at least one of substrate reflectivity information, specular information, spectral information, substrate defect information, substrate damage information, particle contamination information, alphanumeric character information, and any combination thereof.

24.   (Currently Amended)   The signal-bearing medium of claim 20, wherein the system configuration input and the adjustment settings input are input to a graphical user interface (GUI).

25.   (Original)   The signal-bearing medium of claim 20, wherein the steps of configuring and adjusting the optical inspection system are user-selectable steps.

PATENT

Atty. Dkt. No. AMAT/3083.P6/PDC/PDC/OR

26.   (Currently Amended)   The signal-bearing medium of claim 20, <u>wherein the operation</u> further <u>comprises</u> ~~comprising~~ the step of outputting, to a display, the substrate topographical information.

27.   (Currently Amended)   <u>A signal-bearing medium containing a program which, when executed by a controller, performs an operation comprising:</u>

<u>(a)   configuring an optical inspection system in response to system configuration input;</u>

<u>(b)   adjusting the optical inspection system in response to adjustment settings input;</u>

<u>(c)   scanning a substrate using the optical inspection system;</u>

<u>(d)   receiving substrate topography information from the optical inspection system comprising data obtained from the scanning step;</u>

<u>(e)   performing an analysis of the substrate topography information comprising at least one of a particle detection analysis and a process monitoring analysis, wherein the process monitoring analysis comprises:</u>

<u>(i)   determining whether a difference between a value of the data and a reference value exceeds a predetermined value; and</u>

<u>(ii)   if the difference exceeds the predetermined value, determining that an unacceptable topographical condition exists on the substrate; and</u> ~~The signal-bearing medium of claim 20, further comprising the step of~~

<u>(f)</u>   outputting, to a display, the difference between the data <u>value</u> and the reference <u>value</u> ~~data.~~

28.   (Original)   The signal-bearing medium of claim 20, wherein the data comprises signal signature values.

PATENT

Atty. Dkt. No. AMAT/3083.P6/PDC/PDC/OR

29.   (Currently Amended)   ~~The signal-bearing medium of claim 28~~ A signal-bearing medium containing a program which, when executed by a controller, performs an operation comprising:

(a)   configuring an optical inspection system in response to system configuration input;

(b)   adjusting the optical inspection system in response to adjustment settings input;

(c)   scanning a substrate using the optical inspection system;

(d)   receiving substrate topography information from the optical inspection system comprising data obtained from the scanning step, wherein the data comprise signal signature values, wherein each of the signal signature values is weighted by a number of occurrences of the signal-intensity value;

(e)   performing an analysis of the substrate topography information comprising at least one of a particle detection analysis and a process monitoring analysis, wherein the process monitoring analysis comprises:

(i)   determining whether a difference between a value of the data and a reference value exceeds a predetermined value; and

(ii)   if the difference exceeds the predetermined value, determining that an unacceptable topographical condition exists on the substrate.

30.   (Original)   The signal-bearing medium of claim 20, wherein the data comprises spectral characteristics.

31.   (Original)   The signal-bearing medium of claim 30, wherein the spectral characteristics represent a color spectrum.

32.   (Original)   The signal-bearing medium of claim 30, wherein spectral characteristics comprise signal signature values representing a substrate topography.

PATENT

Atty. Dkt. No. AMAT/3083.P6/PDC/PDC/OR

33.   (Currently Amended)   ~~The signal-bearing medium of claim 32~~ A signal-bearing medium containing a program which, when executed by a controller, performs an operation comprising:

(a)   configuring an optical inspection system in response to system configuration input;

(b)   adjusting the optical inspection system in response to adjustment settings input;

(c)   scanning a substrate using the optical inspection system;

(d)   receiving substrate topography information from the optical inspection system comprising data obtained from the scanning step, wherein the data comprise spectral characteristics having signal signature values representing a substrate topography, wherein each of the signal signature values is weighted by a number of occurrences of the signal-intensity value; and

(e)   performing an analysis of the substrate topography information comprising at least one of a particle detection analysis and a process monitoring analysis, wherein the process monitoring analysis comprises:

(i)   determining whether a difference between a value of the data and a reference value exceeds a predetermined value; and

(ii)   if the difference exceeds the predetermined value, determining that an unacceptable topographical condition exists on the substrate.

34.   (Currently Amended)   The signal-bearing medium of claim [[20]] 33, wherein performing [[an]] the analysis of the substrate topographical information further comprises determining a mean value of the data.

35.   (Currently Amended)   The signal-bearing medium of claim [[35]] 34, wherein the operation further comprises ~~comprising~~:

determining whether a difference between the mean value of the data and a mean value reference data exceeds a predetermined value; and

PATENT

Atty. Dkt. No. AMAT/3083.P6/PDC/PDC/OR

if the difference exceeds the predetermined value, determining that the mean value of the data indicates the existence of the unacceptable topographical condition.

36. (Original) The signal-bearing medium of claim 35, wherein if the unacceptable condition is determined, issuing an output status indicating the same.

37. (Original) The signal-bearing medium of claim 35, wherein the unacceptable topographical condition comprises at least one of substrate reflectivity information, specular information, spectral information, substrate defect information, substrate damage information, particle contamination information, alphanumeric character information, and any combination thereof.

38. (Original) The signal-bearing medium of claim 34, wherein the mean value of the data comprises mean signal signature values.

39. (Currently Amended) ~~The signal-bearing medium of claim 20, further comprising, prior to the step of performing an analysis of the substrate topography information:~~ A signal-bearing medium containing a program which, when executed by a controller, performs an operation comprising:

(a) configuring an optical inspection system in response to system configuration input;

(b) adjusting the optical inspection system in response to adjustment settings input;

(c) scanning a substrate using the optical inspection system;

(d) receiving substrate topography information from the optical inspection system comprising data obtained from the scanning step;

(e) performing binarization of the data; ~~and~~

(f) performing morphological operations on the data, wherein morphological operations comprise the steps of filtering noise and enhancing the data output; and

Page 11

PATENT

Atty. Dkt. No. AMAT/3083.P6/PDC/PDC/OR

(g)   performing an analysis of the substrate topography information comprising at least one of a particle detection analysis and a process monitoring analysis, wherein the process monitoring analysis comprises:

(i)   determining whether a difference between a value of the data and a reference value exceeds a predetermined value; and

(ii)   if the difference exceeds the predetermined value, determining that an unacceptable topographical condition exists on the substrate.

40.   (Original)   The signal-bearing medium of claim 39, wherein binarization comprises providing a binary representation of a gray-scale substrate image which is represented as a plurality of pixel values.